



[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 72

[NRC-2015-0270]

RIN 3150-AJ71

List of Approved Spent Fuel Storage Casks: Holtec International HI-STORM 100 Cask System; Certificate of Compliance No. 1014, Amendment No. 10

AGENCY: Nuclear Regulatory Commission.

ACTION: Direct final rule; comment responses.

SUMMARY: On May 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) confirmed the effective date of May 31, 2016, for the direct final rule that was published in the *Federal Register* on March 14, 2016. The direct final rule amended the NRC's spent fuel storage regulations by revising the Holtec International (Holtec) HI-STORM 100 Cask System listing within the "List of approved spent fuel storage casks" to include Amendment No. 10 to Certificate of Compliance (CoC) No. 1014. The NRC confirmed the effective date because it determined that none of the comments submitted on the direct final rule met any of the criteria for a significant adverse comment. The purpose of this document is to provide responses to the comments received on the direct final rule.

DATES: The comment responses are available on **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Please refer to Docket ID **NRC-2015-0270** when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

- **Federal Rulemaking Web site:** Go to <http://www.regulations.gov> and search for Docket ID **NRC-2015-0270**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

FOR FURTHER INFORMATION CONTACT: Robert MacDougall, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-5175; e-mail: Robert.MacDougall@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Background

On March 14, 2016 (81 FR 13265), the NRC published a direct final rule amending its

regulations in § 72.214 of title 10 of the *Code of Federal Regulations* (10 CFR) by revising the Holtec HI-STORM 100 Cask System listing within the “List of approved spent fuel storage casks” to include Amendment No. 10 to CoC No. 1014. Amendment No. 10 adds new fuel classes to the contents approved for the loading of 16×16 class fuel assemblies into a HI-STORM 100 Cask System; allows a minor increase in manganese in an alloy material for the system’s overpack and transfer cask; clarifies the minimum water displacement required of a dummy fuel rod (*i.e.*, a rod not filled with uranium pellets); and clarifies the design pressures needed for normal operation of forced helium drying systems. Additionally, Amendment No. 10 revises Condition No. 9 of CoC No. 1014 to provide clearer direction on the measurement of air velocity and modeling of heat distribution through the storage system.

The NRC received four comment submissions with 22 individual comments on the companion proposed rule (81 FR 13295; March 14, 2016). Electronic copies of these comments can be obtained from the Federal Rulemaking Web site, <http://www.regulations.gov>, by searching for Docket ID **NRC-2015-0270**. The comments are also available in ADAMS under Accession Nos. ML16105A426, ML16105A425, ML16105A424, and ML16105A423. As explained in the March 14, 2016, direct final rule, the NRC would withdraw the direct final rule only if it received a “significant adverse comment.” This is a comment where the commenter explains why the rule would be inappropriate, including challenges to the rule’s underlying premise or approach, or would be ineffective or unacceptable without a change. A comment is adverse and significant if:

- 1) The comment opposes the rule and provides a reason sufficient to require a substantive response in a notice-and-comment process. For example, a substantive response is required when:

- a) The comment causes the NRC staff to reevaluate (or reconsider) its position or conduct additional analysis;

- b) The comment raises an issue serious enough to warrant a substantive response to

clarify or complete the record; or

c) The comment raises a relevant issue that was not previously addressed or considered by the NRC staff.

2) The comment proposes a change or an addition to the rule, and it is apparent that the rule would be ineffective or unacceptable without incorporation of the change or addition.

3) The comment causes the NRC staff to make a change (other than editorial) to the rule, CoC, or Technical Specifications (TSs).

The NRC determined that none of the comments submitted on the direct final rule met any of these criteria and confirmed the effective date of May 31, 2016, for the direct final rule on May 31, 2016 (81 FR 34241). The comments either were already addressed by the NRC staff's preliminary safety evaluation report (SER) (ADAMS Accession No. ML15331A309) for this rulemaking, were beyond the scope of this rulemaking, or were already addressed in a previous rulemaking. The NRC did not make any changes to the direct final rule as a result of the public comments. However, in Section II, "Public Comment Analysis," of this document, the NRC is taking this opportunity to respond to the comments in an effort to clarify information about the 10 CFR part 72 CoC rulemaking process.

II. Public Comment Analysis

For rulemakings amending or revising a CoC, the scope of the rulemaking is limited to the specific changes in the applicant's request for the amendment or amendment revision. Therefore, comments about the system or spent fuel storage in general that are not applicable to the changes requested are outside the scope of this rulemaking. Comments about details of the particular system subject to the rulemaking that do not address the rulemaking's specific proposed changes have already been resolved in prior rulemakings. Persons who have concerns about prior rulemakings and the resulting final rules may consider the NRC's process for petitions for rulemaking under 10 CFR 2.802. Additionally, safety concerns about any

NRC-regulated activity may be reported to the NRC in accordance with the guidance posted on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/allegations/safety-concern.html>. This Web page provides information on how to notify the NRC of emergency or non-emergency issues.

The following paragraphs summarize each individual comment followed by the NRC response.

Comment 1: Noting that this is Holtec's tenth request to amend CoC No. 1014 for the HI-STORM 100 Cask System, one commenter stated that many people find this pattern disturbing. The nine earlier amendments and revisions to CoC No. 1014 suggest that Holtec's overall performance in achieving technical accuracy has been poor, not only in the originally-submitted TSs and quality assurance (QA) for this cask, but in the nine subsequent amendments and revisions that the NRC has approved. Because this is Holtec's tenth amendment, this commenter asserted that Holtec has failed to address the full range of the cask's technical deficiencies comprehensively, and appears instead to have applied the needed QA only in incremental steps.

NRC Response: This comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The NRC is providing a specific response, however, to clarify the NRC's process for issuing and amending CoCs for dry storage system (DSS) casks.

When the NRC first approves a CoC for a particular storage cask design, the CoC is based on a postulated generic spent fuel design using a composite of fuel characteristics and engineered features of the DSS. Important fuel characteristics include the level of the uranium enrichment in the fuel pellets and their burnup time in the reactor. Fuel assembly variables include the composition of the alloys used in the fuel cladding and assembly hardware; the diameter, number, and length of the fuel rods; and the spacing between them. These fuel

characteristics and assembly design variables affect the overall heat load that the cask and multipurpose canister (MPC) holding the fuel assemblies inside the cask must be able to withstand, with a conservative margin of safety, to maintain their integrity for long-term storage under normal, off-normal, and accident conditions. The residual heat and level of uranium burnup in the spent fuel, and the spacing of the fuel in the assemblies, in turn affect the number of fuel assemblies that can be loaded into the MPC, which must have internal components tailored to maintain the configuration of the fuel in the canister. Burnup also affects the composition and physical configuration of the neutron-absorbing materials arranged around the assemblies within the MPC. Each of these considerations must be evaluated with each fuel design to ensure the long-term performance of the overall cask system with an adequate margin of safety.

Fuel and fuel assembly designs have evolved since each storage cask design was originally certified by the NRC. Contemporary fuel assembly designs now differ in several important respects from the generic designs postulated for the casks' original CoCs. To save costs and reduce worker exposures to radiation, for example, many contemporary assembly designs are optimized for fuel with higher enrichment levels to stay in the reactor's core to "burn," or fission, a larger fraction of uranium for a longer period. This produces fewer spent fuel assemblies per unit of power generated. It also stretches out the time between re-fuelings, when workers need to remove the reactor's head to load new fuel assemblies, off-load used ones, and rearrange partially-burned assemblies to maintain the efficiency of the overall fuel burnup within the reactor core. To accommodate the changes in fuel enrichment, fuel cladding materials, and fuel assembly materials and configurations, a similar evolution is continuing in MPC componentry, including neutron-absorbing alloys and other materials, so that casks can safely accept evolving fuel designs.

Therefore, the nine amendments to CoC No. 1014, like amendments to other CoCs, each represent an NRC safety finding about the vendor's analysis of proposed measures to

adapt the cask to a new fuel design for long-term storage. The nine amendments, and the tenth issued in May 2016, are not the product of trial and error, nor of the incremental application of QA, which must be applied in a safety-graded fashion to all aspects of cask design, fabrication, loading, and deployment.

The NRC made no changes to the rule as a result of this comment.

Comment 2: One commenter asserted that in the absence of actual evidence from operational experience or testing, using computer models to estimate a system's behavior or performance has produced "extreme failures" and "major departures between [the computer model's] predictions and [the system's] actual performance." These departures, the commenter stated, resulted in a January 2012, radiation release at San Onofre Nuclear Generating Station's (SONGS) Unit 2 that eventually led to its premature retirement.

NRC Response: This comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The commenter does not identify an issue related to any of the specific revisions proposed in Amendment No. 10 to CoC No. 1014. Instead, this comment is about a reactor licensee's computer models for the performance of a reactor system, not the cask vendor's models for the performance of the HI-STORM 100 Cask System at issue in this rulemaking. Different types of computer models are typically validated using different methods. The NRC uses industry accepted practices to evaluate an applicant's computational modeling software for storage casks in accordance with Interim Staff Guidance SFST-ISG-21, "Use of Computational Modeling Software" (ADAMS Accession No. ML061080669). Because Amendment No. 10 does not involve computational modeling for reactor systems, the comment is not within the scope of this rulemaking.

As the commenter pointed out, there was a radiation release to the environment at SONGS in January 2012. This comment too is about an issue beyond the scope of this

rulemaking. The commenter can obtain more information about the release, which was well below allowable limits, in Southern California Edison's (SCE) report to the NRC on the incident (ADAMS Accession No. ML12090A153), and a report by the NRC Office of the Inspector General (ADAMS Accession No. ML14276A478).

The NRC made no changes to the rule as a result of this comment.

Comment 3: One commenter stated that the proposed CoC amendment pertains to the same or similar Holtec cask as that to be installed at SONGS, and southern California stakeholders are "extremely disappointed" that SONGS' licensee, SCE, has chosen Holtec's 5/8" thin metal cask over 14"-to-20" thick casks that the commenter stated can be inspected in real time to monitor the condition of the spent fuel and measure the depth of stress corrosion cracking.

NRC Response: This comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The commenter does not identify an issue related to any of the specific revisions proposed in Amendment No. 10 to CoC No. 1014, and this rulemaking does not concern SCE's choice of cask products. In addition, the NRC has not approved any spent fuel dry storage cask design that permits the continuous real time inspection or monitoring of the condition of the fuel in the cask, or the continuous or periodic direct measurement of the extent or depth of stress corrosion cracking. Such inspection, monitoring, and measurement cannot be accomplished without the additional worker radiation exposures that would be necessary to open the cask overpack and canister. The NRC's regulation at 10 CFR 20.1101(b), however, requires radiation doses to workers and members of the public to be as low as is reasonably achievable. This makes such additional exposures to open casks and overpacks difficult to justify in light of the very slow rates of degradation in the cask system and its contents that have been measured under realistic conditions in a laboratory.

The commenter's description of Holtec's product as a "5/8" thin metal cask," however, compels a response for clarification purposes. The comment appears to conflate the MPC, which is not a cask, with the entirety of the HI-STORM dry cask storage system. The HI-STORM 100 MPC, which has 1/2" thick stainless steel walls, holds the spent fuel assemblies and their hardware within an overpack. The overpack consists of outer and inner steel walls with the annulus between them filled with concrete. The overpack, with 29 1/2" thick concrete and steel walls, provides radiation shielding and mass for stability against such natural phenomena as winds, floods, and earthquakes. The MPC, an internal component of the cask system, is not directly exposed to these outside phenomena.

The NRC made no changes to the rule as a result of this comment.

Comment 4: One commenter stated that the NRC has "mostly 'dismissed' multiple credible public safety concerns." The commenter also noted that SCE's "Community Engagement Panel" has failed to function as an independent advisory panel of experts, and instead "functions more as a promotional extension of [SCE's] marketing and media platforms."

NRC Response: These comments are not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The commenter did not identify any of the "multiple credible public safety concerns" that the NRC is said to have dismissed. Nor did the commenter explain how any of these concerns pertain to any specific revision proposed in Amendment No. 10 to CoC No. 1014.

The NRC made no changes to the rule as a result of these comments.

Comment 5: One commenter asserted that many stakeholders believe that the NRC has allowed "a utility to improperly apply credit for performing an 'educational' function" that has

involved, among other things, “extensive private meetings with elected officials in adjacent communities in San Diego and Orange County.”

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. In addition, the NRC’s safety-focused mission does not include authority to allow or prohibit a licensee from engaging in public relations activities, which do not directly relate to the design, fabrication, configuration, loading, or deployment of the dry cask storage system at issue here.

The NRC made no changes to the rule as a result of this comment.

Comment 6: A commenter stated that many stakeholders are asserting that SONGS licensee, SCE, “consistently underestimates” the actual extent of potential public safety risks associated with its decommissioning plan.

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The SCE’s decommissioning plan does not pertain to the specific revisions proposed in Amendment No. 10 to CoC No. 1014; nor does the comment identify any specific potential public safety risks pertinent to the other purposes of this amendment.

The NRC has a safety hotline that members of the public can use to report any identified public safety risk, such as may be associated with any decommissioning action. The hotline number is 1-800-695-7403. Note that a call during normal business hours (7:00 a.m. to 5:00 p.m., Eastern Time) will automatically be directed to the NRC Regional Office for the caller’s geographical area. If the call is placed after normal business hours, or can’t be answered by the Regional Office during its normal business hours, the call will be directed to the NRC’s Headquarters Operations Center, which is

staffed 24 hours a day and has a recorded telephone line.

The NRC made no changes to the rule as a result of this comment.

Comment 7: A commenter stated that the licensee expecting to acquire the Holtec casks subject to Amendment No. 10 for spent fuel storage at SONGS has “severely overestimated performance capabilities of equipment, components and parts, defense in depth, operator training, emergency response capability, system reliability, cost containment, and technical capability to safely implement Aging Management Programs.”

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. As noted in the response to Comment 6, the NRC has a safety hotline that members of the public can use to report any identified public safety risk.

The NRC made no changes to the rule as a result of this comment.

Comment 8: Noting the “large inventory” of high-burnup fuel (HBF) in storage at SONGS, a commenter stated that stakeholders have “extreme safety concerns” about the accuracy of the predicted service life of the Holtec underground maximum capacity (UMAX) casks containing HBF, which typically has higher heat loads and radiation levels. Among these concerns, the commenter explained, are “thermal tolerance variability, measurement of air velocity, modeling of heat load distribution, performance capability and integrity of fuel cladding.”

This commenter also stated that with the applicant’s proposed changes in the composition of alloy material in MPC componentry, stakeholders have concerns about the accuracy of predicted helium pressure limits for the MPC in underground installations where closed loop forced helium dehydration (FHD) is mandatory for drying MPCs with one or more HBF assemblies or a higher heat load.

NRC Response: The comment about HBF storage at SONGS is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. None of these revisions included a change in spent fuel burnup specifications. The comment is about the HI-STORM UMAX Canister Storage system, which was authorized generically for underground emplacement under CoC No. 1040 and approved on March 6, 2015 (80 FR 12073). The SONGS will be utilizing cask systems specified by Amendment No. 1 to CoC No. 1040, not Amendment No. 10 to CoC No. 1014.

The commenter also expressed concerns about the accuracy of predicted helium pressure limits for the MPC where closed loop forced FHD is mandatory for drying MPCs with one or more HBF assemblies or a higher heat load. The comment does not explain the basis for the commenter's concern about the predicted pressure limit for drying. This limit was established to provide an ample safety margin against both inadequate pressure for thorough drying and excessive pressure that could result in damage to the spent fuel or other hardware. To maintain this margin, helium pressure limits are controlled during FHD operations at all times. During FHD drying, the MPC's inlet (drain port) and exit (vent port) each have calibrated pressure-indicating devices that show inlet and outlet pressure during drying operations. Trained operators use the helium regulator in accordance with the site's procedures to ensure that the 75-psi limit is not exceeded.

The NRC made no changes to the rule as a result of this comment.

Comment 9: One stakeholder stated that despite Holtec's unproven assurances about the performance capabilities of its casks, a 2015 Sandia National Laboratory report contained evidence that similar thin-metal casks had through-wall cracks in only 5 years.

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The

Sandia National Laboratory report referred to by the commenter was for a set of design specifications for a Standardized Transportation, Aging, and Disposal (STAD) canister for eventual emplacement in a geologic repository (ADAMS Accession No. ML16132A321). The NRC could find nothing in this report to support the commenter's assertion that it "contained evidence that similar thin metal casks had through-wall cracks in only 5 years."

The NRC made no changes to the rule as a result of this comment.

Comment 10: As evidence that Holtec casks are "an inferior choice" for spent fuel storage, one commenter, speaking for "stakeholders in California," referred the NRC to the Web site "sanonofresafety.org."

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014 and does not concern SCE's choice of cask products. Beyond the issue of SCE's choice, if the commenter has concerns about prior spent fuel storage cask rulemakings, or other issues beyond the scope of this rulemaking that make Holtec casks "an inferior choice," the commenter may consider the NRC's process for petitions for rulemaking under 10 CFR 2.802. Additionally, safety concerns about any NRC-regulated activity may be reported to the NRC in accordance with the guidance posted on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/allegations/safety-concern.html>. This Web page provides information on how to notify the NRC of emergency or non-emergency issues.

The NRC made no changes to the rule as a result of this comment.

Comment 11: One commenter criticized the NRC for giving in to Holtec's corporate lawyers and failing to hold the company responsible for "creating inadequate safety measures

within this [cask] design.” The commenter exhorted the NRC to “stop paying for fraud” and force Holtec to “spend [its] own treasure ..., not tax dollars,” to fix the problem.

NRC Response: This comment does not provide sufficient information to identify the “inadequate safety measures” in the Holtec cask’s design that the commenter has in mind. With respect to the concern regarding payment for the NRC’s review and oversight, these functions are not performed at taxpayers’ expense. The vendor, in this case Holtec, pays for the NRC’s evaluation of the application, as the NRC bills the vendor for the review.

The NRC made no changes to the rule as a result of this comment.

Comment 12: A commenter expressed concern that in permitting a cask system to accept additional classes of spent fuel, the NRC does not decrease the ability of these storage systems to contain the fuel under adverse conditions. The commenter wanted to know whether current requirements for the durability of spent fuel storage systems are sufficient to contain these additional fuels, whatever they may be, in the event of a disaster.

NRC Response: The general issue of the durability of spent fuel storage systems to contain additional types of spent fuel in the event of a disaster is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The NRC is addressing the commenter’s concern, however, for educational and clarification purposes.

The NRC addressed a similar comment about the ability of HI-STORM UMAX Canister Storage Systems to withstand seismic events during the CoC No. 1040 certification rulemaking. It should be noted that the certification provided by approval of the HI-STORM 100 Cask System does not, in and of itself, authorize the use of this system at any specific site. Under 10 CFR 72.212(b)(5), before applying the changes authorized by an amended CoC and loading a cask, a general licensee wishing to use this cask system must perform written evaluations in accordance with 10 CFR 72.212 to establish, among other things, that:

- Cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion; and
- The independent spent fuel storage installation at the reactor site where the casks will be located will meet the requirements of 10 CFR 72.104 to ensure that radiation doses beyond the reactor's controlled area do not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid, and 0.25 mSv (25 mrem) to any other critical organ, and are further controlled to a level as low as is reasonably achievable.

The seismic design levels of the HI-STORM 100 Cask System CoC are acceptable for most areas in the continental United States. For locations with potential for seismic activity beyond those analyzed for this system, additional NRC evaluations and certifications may be required before the system may be used in those locations.

Similarly, although the design levels of the HI-STORM 100 Cask System CoC for flooding are also acceptable for most areas in the continental United States – again depending on site-specific analyses – the NRC staff previously evaluated the impacts of flooding during the review of the initial certification for the HI-STORM Flood/Wind (FW) System. In its March 28, 2011, SER for the initial certification of the HI-STORM FW MPC Storage System (see Sections 4.8.2 and 7.3.1 of ADAMS Accession No. ML103020151), the NRC staff considered both full and partial flooding for both the vertical and horizontal positions for the MPC. The NRC staff found that the fully flooded condition would produce the highest reactivity in the spent fuel, and that the fully flooded model for safety evaluations “is acceptable and applicable to all of the assembly configurations that are to be stored in the HI-STORM FW MPC Storage system,” including damaged fuel configurations. In its March 28, 2011, SER, the NRC staff also noted the system's design measures to limit the rise in fuel cladding temperature under the most adverse flood event (one with a water level just high enough to block the MPC overpack's air

convection inlet duct). The changes requested in Amendment No. 10 to CoC No. 1014 do not affect the NRC's prior flooding evaluation for the initial certification of this system.

In addition, under 10 CFR 72.212(b)(6), before using the general license, the reactor licensee must review the Safety Analysis Report (SAR) referenced in the CoC or amended CoC and the NRC's SER evaluating the SAR to determine whether the reactor site parameters, including analyses of earthquake intensity, tornado missiles, and flooding, are enveloped by the cask design bases considered in these reports. Like those for seismic activity, the flooding and tornado missile design levels of the HI-STORM 100 Cask System CoC are acceptable for most areas in the continental United States. For locations with potential for flooding or tornado activity beyond those analyzed for this system, additional NRC evaluations and certifications may be required before the system may be used in those locations.

Therefore, the ability of a particular cask system to protect additional spent fuel types against postulated natural disasters is required to be subject to rigorous analyses, both generic and site-specific, before the fuel can be loaded at any given site. If the design basis of the HI-STORM 100 Cask System CoC No. 1014, Amendment No. 10, cannot be shown to envelop a particular site's parameters, Holtec or another vendor would need to obtain NRC certification for another system meeting the design specifications of the subject spent fuel before it could be loaded for dry storage.

The NRC made no changes to the rule as a result of this comment.

Comment 13: One commenter suggested that the NRC was in collusion with the licensee and cited an e-mail exchange between the licensee and a member of the NRC staff as evidence of such collusion.

NRC Response: The NRC disagrees with the comment. In its capacity as a regulator, the NRC regularly engages in discussions with licensees and applicants to

facilitate a mutual understanding of the need for any licensing action, as well as the scope and intent of the licensing action. The NRC strives to make as much information as possible, including these interactions, publicly available whenever possible except where legal obligations dictate otherwise, such as for proprietary or security-related sensitive information. (see NRC Management Directive 3.4, "Release of Information to the Public" (ADAMS Accession No. ML080310417)). The e-mail exchange cited by the commenter, which is a publicly available document in ADAMS, is one such example of this type of discussion. The NRC grounds its licensing actions on thorough and documented reviews of technical documents that enable the NRC to reach findings that public health and safety, as well as the common defense and security, will be adequately protected.

The NRC made no changes to the rule as a result of this comment.

Comment 14: One commenter objected to the use of a newer American Society of Mechanical Engineers (ASME) code standard for the manganese content in a carbon steel alloy used in some components of the cask system and one commenter asserted that at the 1.5 percent manganese content in the proposed standard, the steel becomes brittle. Furthermore, the commenter contended, these standards are not specific to the nuclear industry, and cannot compensate for poor design. Therefore, the alloy formula must be tested and specific for this particular design and nuclear spent fuel use.

NRC Response: The NRC disagrees with these comments, and has provided its detailed assessment in the preliminary SER for Amendment No. 10 to CoC No. 1014 (ADAMS Accession No. ML15331A309). The minor change in manganese and carbon content of the proposed alloy has been endorsed by the ASME. This endorsement provides a high level of confidence in the quality and safety of the material for nuclear as well as non-nuclear applications. Any change in an ASME standard must be

documented by rigorous testing under carefully controlled conditions. Based on this extensive and peer-reviewed testing, the fact that there is no change to the properties used in the original technical basis for the HI-STORM 100 Cask System CoC, and the fact that none of the safety analyses for this CoC are affected by the minor change in manganese content, the NRC believes that further testing for this specific application is unnecessary.

The proposed increase in manganese content from 1.2 percent to 1.5 percent maintains, if not improves, the toughness properties of the SA-516 Grade 70 steel used in the HI-STORM 100 Cask System overpack. The NRC's preliminary SER for Amendment No. 10 to CoC No. 1014 analyzed this proposed amendment and related Holtec documents and found that there is no change to the material strength, material density, or thermal properties of the SA-516 alloy steel, as indicated in the ASME 2007 and 2010 codes. In order to use the alloy approved in the updated 2007-2010 ASME codes, Holtec was required to request an amendment to use these codes for this alloy because the original HI-STORM 100 Cask System CoC references only the 1995-1997 ASME codes.

The NRC made no changes to the rule as a result of this comment.

Comment 15: A commenter stated that concrete temperature should be properly measured on a continuous basis. The same commenter also stated that each cask should be tested due to possible defects or damage during loading, as well as differences in the types and ages of spent fuel. Because conditions change over time, monitoring should be constant.

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The NRC agrees that concrete temperatures are important and should be properly measured,

but disagrees that continuous measurement of these temperatures and constant monitoring are needed. Continuous measurement and constant monitoring of temperatures are unnecessary in an operating environment of very gradual temperature changes. Revision 1 of NUREG-1536, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility" (ADAMS Accession No. ML101040620), notes that for storage systems with internal air flow passages, the NRC has accepted periodic visual inspection of vents coupled with temperature measurements to verify proper thermal performance and detect flow blockages. The inspections are to take place within an interval that will allow sufficient time for corrective actions to be taken before the limiting accident temperature for spent fuel cladding is reached. The inspection interval should be more frequent than the time interval required for the fuel to heat up to the established accident temperature criteria, assuming a total blockage of all inlets and outlets.

The NRC made no changes to the rule as a result of this comment.

Comment 16: A commenter contended that all airflow and temperature measurements should be made "constantly ... not one time only," and performed "on intake and output and within the annulus and with an up to date measurement device and not an antiquated anemometer."

NRC Response: The NRC disagrees with these comments. The NRC evaluated the proposed conditions for airflow and temperature measurements in its final SER (ADAMS Accession No. ML003711865) for the initial issuance of CoC No. 1014 in 2000, and did not find that constant temperature measurements were necessary. That SER noted that in addition to the mandatory initial air temperature rise test when the system is first placed in service, the overpack air inlet and outlet vents would be periodically surveyed or an optional overpack air temperature program would be implemented to verify continued operability of the heat removal

system. Operating experience with this cask system since that time has given the NRC no reason to change its initial position on the need for constant temperature measurement.

Concerning the commenter's statement about the need for an up-to-date measurement device, the NRC has not specifically required the use of hot-wire anemometer or any other airflow measurement technology. The applicant may propose the use of any technology it believes will measure airflow with sufficient accuracy and reliability. The NRC is not aware of any basis to prohibit the use of hot-wire anemometer technology for measuring airflow or temperature.

The NRC made no changes to the rule as a result of these comments.

Comment 17: The same commenter that provided Comment 16 objected that Holtec and the NRC did not provide adequate information on "other topics," and that this must be presumed to diminish the safety of the "flimsy" Holtec cask system.

NRC Response: The commenter did not specify any grounds for pronouncing the HI-STORM 100 Cask System flimsy, or any "other topics" for which additional information might be considered adequate.

The NRC made no changes to the rule as a result of this comment.

Comment 18: A commenter contended that "measurements are not supposed to validate methods outside of experiments testing theory," and that the requirement to "demonstrate" an airflow model with measurements implies "fraudulent" intent to "play with numbers to get what [NRC] and/or Holtec want" to show the safety of the storage cask system.

NRC Response: These comments are not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The NRC also disagrees with these comments. The NRC does not require

measurements to validate methods that cannot be tested experimentally. The commenter particularly disapproved of a draft NRC requirement in an e-mail to Holtec (ADAMS Accession No. ML15327A043) in which users of the HI-STORM 100 Cask System would be required to perform a “thermal validation test” to measure the total air mass flow rate through the cask system using direct measurements of air velocity in the inlet vents. The user would then be required to do an analysis of the cask system with these measurements “to demonstrate that the measurements validate the analytic methods” described in Chapter 4 of Holtec’s Final Safety Analysis Report (ADAMS Accession No. ML14086A412), supporting its application for CoC No. 1014. The NRC has reason to require a licensee to demonstrate that an analytic method for thermal modeling of airflow through a cask is supported by real-world measurements. In making this demonstration, a licensee could “play with numbers” if it were allowed to measure anywhere it chose, but that is not the case here. The licensee is required to take measurements at NRC-specified locations.

The NRC made no changes to the rule as a result of these comments.

Comment 19: Citing NRC regulations at 10 CFR 72.236, “Specific requirements for spent fuel storage cask approval and fabrication,” one commenter alleged that Holtec violated U.S. law because “the only protection from lethal radiation leaks is the 1/2 inch MPC, whereas ‘The spent fuel storage cask must be designed to provide redundant sealing of confinement systems.’”

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The NRC also disagrees with this comment. The MPC does provide protection from radiation leaks, but it is not the only protective barrier. Radiation shielding is also provided by the HI-STORM 100 Cask System overpack that is composed of inner and outer steel shells with the annulus

between them filled with concrete, which is the primary radiation shielding material. If the commenter was referring only to leakage of radioactive materials from the MPC, however, Section 7.1 of the SER (ADAMS Accession No. ML003711865) for the HI-STORM 100 Cask System confirms the presence of redundant sealing of confinement systems in the canister's design:

The [MPC] confinement boundary includes the MPC shell, the bottom baseplate, the MPC lid (including the vent and drain port cover plates), the MPC closure ring, and the associated welds. ... The MPC lid (with the vent and drain port cover plates welded to the lid) and closure ring are welded to the upper part of the MPC shell at the loading site. This provides redundant sealing of the confinement boundary. ... The redundant closures of the MPC satisfy the requirements of 10 CFR 72.236(e) for redundant sealing of confinement systems.

The MPC's confinement design has multiple related purposes. The confinement design ensures that potentially contaminated air is contained within the MPC and that the MPC remains filled with helium coolant, so that the MPC can fulfill a third purpose: to keep outside air from contacting the spent nuclear fuel for the licensed life of the system.

In addition to the redundant barriers to airborne radiation leakage in the design of the HI-STORM 100 MPC and cask system, there are procedural requirements to ensure that the system and its components function in operation as designed. In accordance with the CoC itself (ADAMS Accession No. ML15331A307), the design, purchase, fabrication, assembly, inspection, testing, operation, maintenance, repair, and modification of all structures, systems, and components that are important to safety, both for the MPC and the system as a whole, must be conducted in accordance with a Commission-approved quality assurance program that satisfies the applicable requirements of 10 CFR part 72, subpart G.

The CoC also requires that when the MPC shell is welded to its baseplate, the fabricator must perform a helium leak test of the MPC weld's confinement using a helium mass spectrometer. This weld leakage test must include the base metals of the MPC shell and

baseplate. Another helium leak test must be performed on the base metal of the fabricated MPC lid. Then, in the field, a helium leak test must be performed on the vent and drain port confinement welds and cover plate base metal before the loaded MPC can be emplaced within the concrete overpack. All MPC confinement boundary leakage rate tests must be performed in accordance with ANSI N14.5 to “leaktight” criteria. If the user detects a leakage rate exceeding the acceptance criteria, the user must determine the area of leakage and repair it to meet ASME Code Section III, Subsection NB requirements. The affected area must then be re-tested until the leakage rate acceptance criterion is met.

The NRC made no changes to the rule as a result of this comment.

Comment 20: Citing NRC regulations at 10 CFR 72.236, “Specific requirements for spent fuel storage cask approval and fabrication,” a commenter asserted that Holtec violated U.S. law also because its storage cask is not designed to provide adequate heat removal capacity without active cooling systems, and “[t]he refusal to properly test [the cask’s heat removal capacity] appears intentional to avoid knowing if it properly removes heat.”

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. The comment also does not explain how Holtec storage casks are not designed to meet the 10 CFR 72.236 requirement to provide adequate heat removal capacity without active cooling systems. HI-STORM 100 Cask Systems have been deployed at independent spent fuel storage installations for more than a decade without active cooling systems.

The NRC disagrees with the comment. The NRC’s preliminary SER evaluated Holtec’s supporting thermal analysis for Amendment No. 10 to CoC No. 1014 and found that the HI-STORM 100 Cask System certification “continues to be designed with a heat-removal capability having verifiability and reliability consistent with its importance to safety.” The SER also found that spent fuel cladding continues to be protected against thermal degradation leading to gross

ruptures, and other cask component temperatures continue to be maintained below the allowable limits for the accidents evaluated.

There has been no refusal to test the cask system's heat removal capacity. The CoC language has been revised to require CoC No. 1014, Amendment No. 10, users to submit thermal validation test and analysis results in a letter report to the NRC within 180 days of either the user's loading of the first cask or undertaking the first spent fuel transfer operation with a cask fabricated to Amendment No. 10 specifications. The revised condition also states, however, that for casks of the same system type, users may document in their 10 CFR 72.212 report a previously performed test and analysis that has demonstrated adequate validation of the analytic thermal methods. The NRC will evaluate whether this previous test and analysis continues to demonstrate adequate validation of thermal analysis methods in light of the uncertainty of airflow measurements at the previously-specified locations.

The NRC made no changes to the rule as a result of this comment.

Comment 21: One commenter stated that the NRC has violated the Plain Writing Act of 2010 by failing to make the topics associated with this rulemaking clear, and failing to "attach ... the relevant documents in an orderly, clear manner."

NRC Response: The NRC disagrees with these comments. The topics associated with this rulemaking must necessarily address the CoC amendments requested by the applicant, and these are by nature highly technical. The March 14, 2016 (81 FR 13265), *Federal Register* notice of the direct final rule does, however, seek to explain in language as non-technical as possible the practical effects of the amendment requests for the use of the Holtec HI-STORM 100 Cask System under Amendment No. 10 of CoC No. 1014. In general, the NRC strives to write agency documents in a clear, concise, well-organized manner that also follows other best practices appropriate to the subject and the intended audience.

As to the comment that documents relevant to this rulemaking were not “attached ... in an orderly, clear manner,” the NRC followed its normal process of providing the ADAMS accession numbers to referenced documents so that interested persons may obtain access to the documents. If the commenter was referring instead to the table of references provided in the *Federal Register* notice for the direct final rule, the NRC also disagrees that the relevant documents were not presented in an orderly, clear manner. The order of the references starts with the applicant’s amendment request, moves to the proposed revised CoC and TS documents supporting it, and concludes with the NRC’s response to these submittals in the form of its SER on the proposed revisions.

The NRC made no changes to the rule as a result of these comments.

Comment 22: One commenter stated that the percentage of the NRC’s budget that must be recovered should be recovered in fines and not fees.

NRC Response: The comment is not within the scope of this rulemaking, which is limited to the specific revisions proposed in Amendment No. 10 to CoC No. 1014. Under the Omnibus Budget Reconciliation Act of 1990, as amended, the NRC is required by law to recover 90 percent of its budget through fees for licensing and other actions. Therefore, any change in

this requirement can only be achieved by an act of Congress.

The NRC made no changes to the rule as a result of this comment.

In summary, the NRC did not receive any comments that warranted withdrawal of the direct final rule. Therefore, none of these comments required a change in the rule's effective date of May 31, 2016.

Dated at Rockville, Maryland, this 28th day of September, 2016

For the Nuclear Regulatory Commission.

Michael R. Johnson,
Acting Executive Director for Operations.

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